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FORAMINIFERA FROM THE EOCENE OF COWLITZ RIVER, LEWIS COUNTY, WASHINGTON

by
G. DALLAS HANNA
and
MARCUS A. HANNA

SEATTLE, WASH.
UNIVERSITY OF WASHINGTON
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Foraminifera From the Eocene of Cowlitz River Lewis County, Washington

by

G. DALLAS HANNA and MARCUS A. HANNA

Some exceedingly fossiliferous strata are exposed on the west bank of the Cowlitz River near Vader, Lewis County, Washington. A study of the Mollusca has shown definitely that the age of the rocks is Eocene. Several papers have been written on the subject. Chronologically they are as follows:

Weaver, *Washington Geological Survey, Bulletin* 15, 1912, pp. 13-14.

Arnold and Hannibal, *American Philosophical Society, Proceedings,* Vol. 52, 1913, pp. 567-569.

Dickerson, *California Academy of Sciences, Proceedings,* Ser. 4, Vol. 5, 1915, pp. 35, 38, 47-51.

Weaver, *University of Washington Publications, Geology,* Vol. 1, No. 1, 1916, pp. 3, 8, 24-26.

Weaver, *Washington Geological Survey, Bulletin* 13, 1916, pp. 81-99, 159-163.

Weaver, *California Academy of Sciences, Proceedings,* Ser. 4, Vol. 6, No. 1, 1916, pp. 1-17.

Weaver and Palmer, *University of Washington Publications, Geology,* Vol. 1, No. 3, 1922. (Some new species of mollusks described.)

On account of the similarity of the molluscan fauna of the Cowlitz locality to that of the Tejon Eocene at the type locality in the southern end of the San Joaquin Valley, California, both Weaver and Dickerson have considered the deposits to be equivalent in age. Actually very few species are common to the two formations, but almost every representative in the one has its analogue in the other. This may indicate that mollusks at that time were considerably more plastic than commonly believed at present, or that the deposits are not exactly contemporaneous. Under any circumstances the faunas are too similar to admit of great disparity of age. Unfortunately the rocks at the type locality of the Tejon are not such as would permit the ready extraction of Foraminifera, and no species has thus far been recognized there.

The upper beds of the exposures on the Cowlitz River are of poorly stratified, fine, light gray shale. These beds contain a considerable number of Foraminifera, which are in most cases beautifully preserved. It is the purpose of this paper to place on record the small fauna of these organisms collected by one of us (M.A.H.) in September, 1923, from the shale in the west bank of the Cowlitz River just below the large bend, about one and three-fourths miles east of Vader, Lewis County, Washington.

While the number of species is small, the general appearance of the lot is strikingly like that of various other classical Eocene collecting stations, such as in California at Marysville Buttes, Coalinga, and San Diego. It cannot be said, however, that any of the species are identical, because the Foraminifera from those places have not been critically studied.

QUINQUELOCULINA IMPERIALIS n. sp.

Plate XIII, Figures 7, 8, 10.

Test large and robust, heavy, angles rounded in adults, sharp in juvenile specimens; five chambers visible in end view of adult; aperture a narrow oval, truncate at one end and with a central projection at the other which is heavy and bifid at its outer end.

Cotypes.—Nos. 52-53, Uni. Wash. Coll. Invert. Palae.

Occurrence.—Locality 22H. From the shale in the west bank of the Cowlitz River just below the large bend, about one and three-fourths miles east of Vader, Lewis County, Washington.

QUINQUELOCULINA GOODSPEEDI n. sp.

Plate XIII, Figures 3, 4.

Test smooth, much longer than *Q. imperialis* and narrower; ovate in cross section, edges rounded; five chambers visible in end view; aperture circular, placed a considerable distance from the suture, with a short tongue-shaped central projection.

Type.—No. 54, Univ. Wash. Coll. Invert. Palae.

Occurrence.—Locality 22H. From the shale in the west bank of the Cowlitz River just below the large bend, about one and three-fourths miles east of Vader, Lewis County, Washington.

Named for Prof. George E. Goodspeed, Jr., University of Washington.

This elongate species differs in detail from any which can be found and it is believed to be undescribed. The circular aperture situated a considerable distance from the suture and the rounded chambers are characters which seem to distinguish it from others of the group.

QUINQUELOCULINA GLOBOSA n. sp.

Plate XIII, Figures 1, 2.

Test almost globular, slightly flattened on two sides; smooth, hyaline; three visible chambers separated by suture line which is not sunken or raised; aperture large and open, near inner margin of last chamber; no central appendage present in specimens studied and evidently none was ever present.

Type.—No. 55, Univ. Wash. Coll. Invert. Palae.

Occurence.—Locality 22H. From the shale in the west bank of the Cowlitz River just below the large bend, about one and three-fourths miles east of Vader, Lewis County, Washington.

This small globose species with the open aperture is distinct from any others thus far studied in west American Tertiary deposits, and so far as we have been able to determine is unlike any other previously described.

TRUNCATULINA WUELLERSTORFI (Schwager)

Plate XIII, Figures 13, 18.

A large heavily ribbed form of *Truncatulina* has been referred to the above species provisionally. It is coarsely punctate and on the vertical side has a deep depression between the heavy ribs, especially in the later-formed portion of the test. The species was originally described from fossils from Kar Nicbar (*Schwager, Novara Exped. Geol. Thiel,* Vol. 2, 1866, p. 258, pl. 7, figs. 105, 107) but has been recorded as living in most oceans. The original description has not been seen, and identification has been made from publications dealing with material supposed to be the same as Schwager's. The species is common in the Cowlitz locality.

Plesiotypes.—Nos. 59-60, Univ. Wash. Coll. Invert. Palae.

Occurrence.—Locality 22H. From the shale in the west bank of the Cowlitz River just below the large bend, about one and three-fourths miles east of Vader, Lewis County, Washington.

TRUNCATULINA PRÆCINCTA ? Karrer

Plate XIII, Figures 11, 12.

A fairly common species in the Cowlitz locality has been referred to the above name questionably because all of the specimens are more or less imperfect. The surface is punctate between the sutures, and the umbilicus is a narrow shallow depression.

One of us recently referred some imperfect specimens from the Eocene near Vacaville, California (*Univ. Calif. Publ. Geol.* Vol. 14, 1923, p. 325, pl. 59, fig. 3) to *Rotalia soldanii* (d'Orbigny) but it is possible that they could better be placed in *T. præcincta.*

Plesiotypes.—Nos. 56-57, Univ. Wash. Coll. Invert. Palae.

Occurrence.—Locality 22H. From the shale in the west bank of the Cowlitz River just below the large bend, about one and three-fourths miles east of Vader, Lewis County, Washington.

NODOSARIA LÆVIGATA d'Orbigny

Plate XIII, Figure 9.

One specimen from the Cowlitz Eocene locality has been referred to this species. It may belong to the subspecies *elliptica* Reuss, as defined by Brady, (*Rept. Voy. H. M. S. Challenger Zool.* Vol. 9, 1884, p. 490-493, pl. 61, fig. 19) who stated that typical *lævigata* has a spine at the apex. The same author and several others have maintained that the large number of variations of the

Nodosaræ of this group belong to but one species. While this statement will probably not bear the test of modern taxonomy, we believe more than one specimen is necessary for a study of any particular variation; therefore the group name *lævigata* is used in this instance.

Plesiotype.—No. 58, Univ. Wash. Coll. Invert. Palae.

Occurrence.—Locality 22H. From the shale in the west bank of the Cowlitz River just below the large bend, about one and three-fourths miles east of Vader, Lewis County, Washington.

NODOSARIA ROEMERI (Neugeboren)

Plate XIII, Figure 21.

One specimen from the Cowlitz Eocene locality is referred to this species as defined by Brady (*Rept. Voy. H. M. S. Challenger, Zool.* Vol. 9, 1884, p. 505, pl. 63, fig. 1) in the *Challenger* Report. It differs from the very common and widely distributed *N. communis* d'Orbigny, in having fewer chambers and a rounded initial end. It has been stated, however, that this and many other variations form a single intergrading series called the *communis* group. Rather than assume that this is true, it has seemed best to refer our specimen to a form which it resembles very closely.

Plesiotypes.—No. 61, Univ. Wash. Coll. Invert. Palae.

Occurrence.—Locality 22H. From the shale in the west bank of the Cowlitz River just below the large bend, about one and three-fourths miles east of Vader, Lewis County, Washington.

POLYMORPHINA LANDESI n. sp.

Plate XIII, Figures 16, 17.

Test pyriform, smooth, ovate in cross section, slightly asymmetrical in relation to a plane drawn vertically to the paper (fig. 16) and from aperture to apex; aperture stellate, situated at the end of a blunt projection of the last chamber; three chambers visible on flattened side, sutures calloused over and almost obliterated.

Type.—No. 51, Univ. Wash. Coll. Invert. Palae.

Occurrence.—Locality 22H. From the shale in the west bank of the Cowlitz River just below the large bend, about one and three-fourths miles east of Vader, Lewis County, Washington.

Named for Dean Henry Landes, University of Washington.

This species resembles *P. amygdaloides* (Reuss) as figured by Brady (*Rept. Voy. Challenger, Zool.* Vol. 9, 1884, p. 560, pl. 71, fig. 13) more than any other seen in that work, but in that species the sutures are characteristically well impressed; in fact the compressed test is about all they have in common; finer details are very dissimilar. *P. byramensis* Cushman (*U. S. Geol. Surv. Prof. Ppr.* 133, 1923, p. 31, pl. 5, figs. 1-5) is somewhat similar but has more inflated chambers.

CRISTELLARIA SAUNDERSI n. sp.

Plate XIII, Figures 5, 6, 15.

Test greatly elongate, when adult composed of seven or more chambers that are free of the small apical portion; between the chambers the septae are elevated into high rounded ridges; aperture stellate, at the outer edge of the last chamber; edges are sharpely angulate but not distinctly keeled; in the specimens examined the color is dark brown, but other species are gray or buff.

Cotypes.—Nos. 49-50, Univ. Wash. Coll. Invert. Palae.

Occurrence.—Locality 22H. From the shale in the west bank of the Cowlitz River just below the large bend, about one and three-fourths miles east of Vader, Lewis County, Washington.

Named for Prof. E. J. Saunders, University of Washington.

This species belongs to a group of *Cristellaria,* which in its extreme form differs very greatly from the usual test as exemplified in *C. rotulata.* No representative of the group has previously been listed from Western America, but in 1905 Anderson (*Anderson, F. M., Calif. Acad. Sci. Proc.* 3rd ser. Vol. 2, No. 2, 1905, pl. 13, fig. 19) figured a specimen as *Vaginulina* from the Eocene near Coalinga, California, which is very close, probably the same as the present. He did not name the species. The rock from which this figure was drawn was burned in the conflagration of 1906, when the California Academy of Sciences collection was largely destroyed; but in this case the specimen was found in the ashes with very little damage done.

CRISTELLARIA ROTULATA (Lamarck)

Plate XIII, Figures 14, 19, 20.

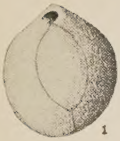
A species of *Cristellaria* referred to the above name is the most abundant foraminifer in the Cowlitz deposit. A thorough study of the group may show that not all the references of living material to *rotulata* are the same as the species described by Lamarck; but it appears that the Eocene fossils now being considered can be placed there. The difference between *rotulata* and *cultrata* was stated by Brady (*Rept. Voy. H. M. S. Challenger, Zool.* Vol. 9, 1884, p. 550) to be in the presence of a distinct, sharp marginal keel in the latter. The Cowlitz specimens do not show a trace of such a structure as the drawing of an edge view herewith shows. The specimens are decidedly heavy, smooth externally, and with the septæ showing merely as a more translucent callous deposit; only the aperture of the last chamber is visible; in living specimens it is said that the remains of previous apertures are distinctly visible on the margin.

Plesiotypes.—Nos. 46-48, Univ. Wash. Coll. Invert. Palae.

Occurrence.—Locality 22H. From the shale in the west bank of the Cowlitz River just below the large bend, about one and three-fourths miles east of Vader, Lewis County, Washington.

EXPLANATION OF PLATE XIII

		Page
Fig. 1.	*Quinqueloculina globosa* n. sp. x 40	58
Fig. 2.	*Quinqueloculina globosa* n. sp. x 40	58
Fig. 3.	*Quinqueloculina goodspeedi* n. sp. x 40	58
Fig. 4.	*Quinqueloculina goodspeedi* n. sp. x 40	58
Fig. 5.	*Cristellaria saundersi* s. sp. x 33	61
Fig. 6.	*Cristellaria saundersi* s. sp. x 33	61
Fig. 7.	*Quinqueloculina imperialis* n. sp. x 40	58
Fig. 8.	*Quinqueloculina imperialis* n. sp. x 40	58
Fig. 9.	*Nodosaria lævigata* d'Orbigny x 40	59
Fig. 10.	*Quinqueloculina imperialis* n. sp. x 33	58
Fig. 11.	*Truncatulina præcincta* ? Karrer x 33	59
Fig. 12.	*Truncatulina præcincta* ? Karrer x 33	59
Fig. 13.	*Truncatulina wuellerstorfi* (Schwager) x 33	59
Fig. 14.	*Cristellaria rotulata* (Lamarck) x 33	61
Fig. 15.	*Cristellaria saundersi* n. sp. x 40	61
Fig. 16.	*Polymorphina landesi* n. sp. x 40	60
Fig. 17.	*Polymorphina landesi* n. sp. x 40	60
Fig. 18.	*Truncatulina wuellerstorfi* (Schwager) x 33	59
Fig. 19.	*Cristellaria rotulata* (Lamarck) x 33	61
Fig. 20.	*Cristellaria rotulata* (Lamarck) x 33	61
Fig. 21.	*Nodosaria roemeri* (Neugeboren) x 40	60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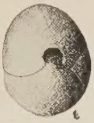
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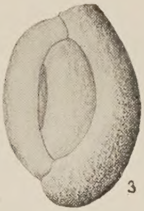
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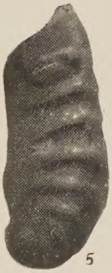
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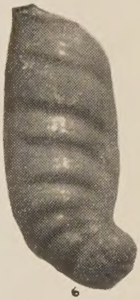
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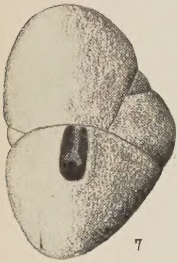
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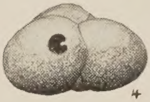
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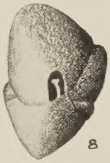
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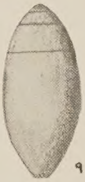
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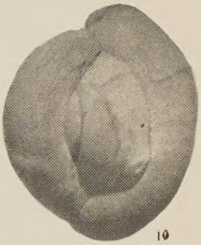
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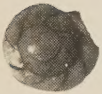
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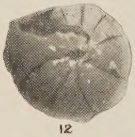
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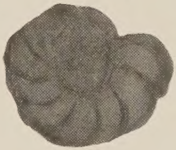
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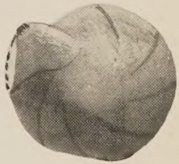
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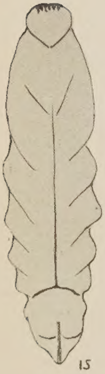
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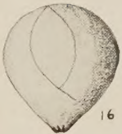
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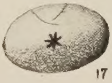
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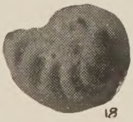
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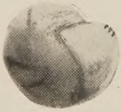
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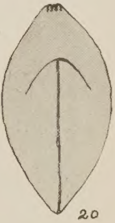
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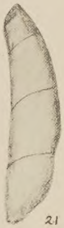
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